

# Grid-Free LES 3D Vortex Method for the Simulation of Tubulent Flows Over Advanced Lifting Surfaces, Phase I

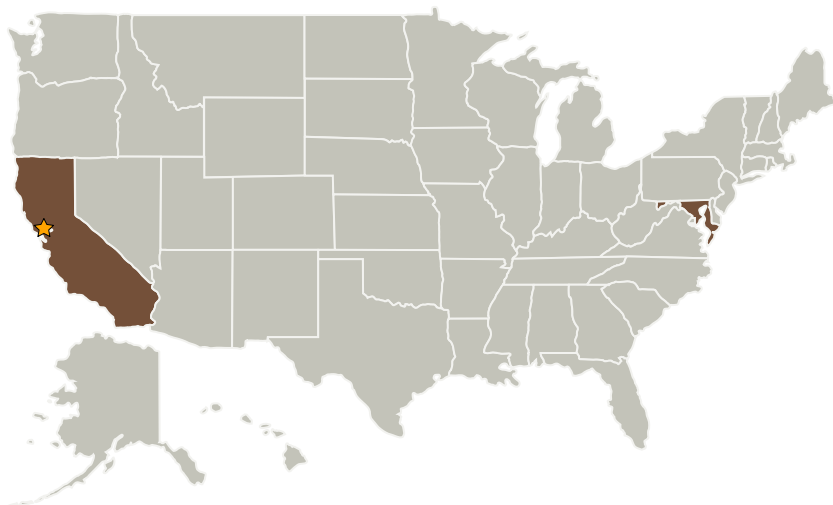
Completed Technology Project (2008 - 2008)



## Project Introduction

Turbulent flows associated with advanced aerodynamic designs represent a considerable challenge for accurate prediction. For example, the flow past low-speed wings requires the representation of complex physics involving separation onset/progression (both leading-and trailing-edge), vortex/viscous interactions, merging shear layers with strong curvature, juncture flows and jet-exhaust flows -- all phenomena that are not amenable to robust modeling and simulation by traditional grid-based techniques. Recent advances in the technology of gridfree turbulent flow simulation via vortex methods, most notably as manifested in the VorCat code, has raised the possibility of efficiently and accurately capturing the behavior of aerodynamic flows for use in design and performance analysis. The goal of this SBIR phase I proposal is to demonstrate the effectiveness of VorCat in simulating high lift airfoil flows - both in regards to computational speed and accuracy. This will form the basis for developing a tool able to well model arbitrary aerodynamic flows past finite wings including complicating features such as flow control devices in the Phase II study. Upon completion of Phase II, a validated technology will be ready for use by industrial and governmental users.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Ames Research Center (ARC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
VorCat, Inc.	Supporting Organization	Industry	Rockville, Maryland

## Primary U.S. Work Locations

California	Maryland
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Jacob Krispin

## Technology Areas

**Primary:**

- TX15 Flight Vehicle Systems
  - └ TX15.1 Aerosciences
    - └ TX15.1.1 Aerodynamics